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COATED FABRIC

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(57) Claim

1. A fabric comprising a flexible plastics substrate having both sides coated with a first layer of white or light reflective flame retardant composition over which is a further layer of a continuous grid pattern dark coloured semi-conductive liquiform composition, both compositions being applied as liquids to the substrate and subsequently dried or solidified.

10. A method of rendering a flexible sheet plastics substrate both semi-conductive and light reflecting including the steps of:

(a) melt extruding onto at least one surface of the substrate a layer of a polyolefin such as polyethylene or polypropylene and allowing the layer to solidify;

(b) applying a white or light reflective flame retardant composition in the form of a liquid to both exposed surfaces;

(c) causing the white or light reflective composition to dry or solidify;

(d) applying in a grid pattern a dark coloured semi-conductive composition in the form of a liquid to both surfaces of the white or light reflective composition;

(e) causing the semi-conductive composition to dry or solidify.

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Form 10

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COMPLETE SPECIFICATION

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TO BE COMPLETED BY APPLICANT

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Complete Specification for the Invention entitled:

"COATED FABRIC"

The following statement is a full description of this invention, including the best method of performing it known to me:

050871.B2.

This invention relates to a flame retardant, semi conductive flexible fabric made by applying a liquiform coating on to a flexible substrate.

It is particularly applicable to brattice fabric for use in coal mining, made by coating flexible plastics substrate such as woven polyolefin with liquid coating compositions.

The qualities required of a brattice fabric used, such as for ventilation duct construction in coal mining, made by the coating of fabrics, include the imparting of at least all the following attributes in combination; namely, semi-conductivity, flame retardency with visibility and light reflection in conditions of very low light intensity. Ideally the fabric should also be immune or resistant to deterioration of those attributes such as may be caused by frequent water washing whilst in service.

Known brattice coating compositions have been restricted by the requirement of being adequately visible and light reflective when used in an underground coal mine to rule out use of dark coloured components which would otherwise be effective in providing improvement in the required semi-conductivity or static dissipating property.

A significant example is the avoidance in known compositions of the use of graphite or finely divided carbon to impart semi-conductivity. A very minor percentage of graphite in a composition results in a colour far too dark to be acceptable for coal mine use. Even so, that low level of graphite is insufficiently conductive in a composition to be useful for preventing dangerous build-up of electrostatic charge which could result in sparking and explosion or fire in the presence of airborne coal dust and/or methane.

An excessively high content of graphite has been found unacceptable from the point of view of flame retardency since too much graphite assists rather than retards combustion of the coated fabric.

But it has now been discovered that graphite incorporated in the coating composition at a level below that which would promote combustion can nevertheless provide a useful and adequate degree of semi-conductivity or static dissipation.

Furthermore the requirement can be met by the composition when applied included with a binder vehicle which enables the composition to adhere well to a polyolefin substrate and be substantially immune to repeated washing. Adhesion of the coating composition is a requirement and non-deterioration of the properties of the coated fabric caused by washing is a highly preferred property.

However the desired degree of semi-conductivity can only be achieved at a graphite loading of the composition such as causes the colour to be much too dark to be acceptable for use in coal mines. The provision of a highly visible brattice assists noticing torn areas for repair and in generally improving visibility.

In order to overcome this problem the present invention proposes two ways within the scope of a single inventive concept in order to provide a useful flame retardant, semi-conductive fabric.

In order to meet the definition of a dark coloured semi-conductive coating composition in accordance with this invention, a minimum loading of dark coloured conductive or semi conductive component of 15% by weight is intended.

It has been now discovered that if an otherwise black or dark fabric is provided with many white or light reflective coloured areas preferably uniformly spaced over the surface then adequate visibility is obtained in a mine application.

In a first embodiment the invention consists of fabric comprising a flexible plastics substrate having both sides coated with a first layer of white or light reflective flame retardant composition over which is a continuous grid pattern dark coloured semi-conductive composition, both compositions being applied as liquids to the substrate and subsequently dried or solidified.

An alternative form of the invention consists of a brattice fabric comprising a flexible plastics substrate coated both sides with a layer of a dark coloured semi-conductive flame retardant composition over which is a discontinuous white or light reflective visibility layer applied as a liquid composition, both compositions being dried or solidified after application.

The invention is now described with reference to a presently preferred embodiment and variations thereof by way of examples.

Example 1.

A brattice fabric is made by the following steps:

A woven polypropylene fabric of mass 110 grams/square metre is coated on both sides with a liquid composition comprising flame retardant components, semi-conductive or conductive components, adhesive components and a suitable solvent to make the mixture liquid for spreading of the coating onto the fabric. One preferred composition consists of the following:

By Weight	
Chlorinated Wax, eg Cerechlor (t.m.)	45%
Butyl Rubber Adhesive	25%
Antimony trioxide	25%
Graphite	15%
TOTAL	100%

All ingredients are finely divided, intimately mixed and thinned to liquid application consistency with a suitable volatile hydrocarbon solvent such as X2. Suspension stability of the mixture and viscosity may be raised by incorporation of a thickening agent such as bentonite.

After coating both sides the fabric is preferably dried before any further application. In this form, the coated fabric is essentially black in colour and as such would be unacceptable for use in coal mines. In order to make the fabric acceptably visible and light reflective, visibility markers such as a white paint which adheres to the semi-conductive coating is applied. An acrylic water washable white or light coloured paint can be used for the visibility markers or a light coloured flame retardant layer.

The markers preferably cover from 10% to 80% of the surface area and are arranged in the form of discontinuous non-connected areas uniformly spaced over the surface.

The preferred size of each marker is 24mm maximum straight line dimension. Whilst no particular shape of marker is particularly preferred, square or round markers are suitable. The preferred colour of markers is white but orange, yellow and so-called

fluorescent colours are suitable. After application of the visibility markers they are allowed to dry.

EXAMPLE 2

A brattice fabric is made by the following steps:-

A woven polypropylene fabric of unit mass 110 grams/square metre is coated on both sides with a liquid composition having a light colour which comprises flame retardant and adhesive components thinned to application consistency with a suitable organic solvent. One preferred composition consists of the following:-

By Weight	
Chlorinated wax, eg Cerechlor (t.m.)	50%
Butyl rubber adhesive	25%
Antimony trioxide	25%
TOTAL	100%

All ingredients are finely divided, intimately mixed and thinned to application consistency with a suitable hydrocarbon solvent such as X2. Suspension stability of the mixture and viscosity may be raised by incorporation of a thickening agent such as bentonite.

Preferably after drying the layers applied to both sides a second layer is applied to each side which consists of an interconnected grid pattern of a dark coloured graphite based semi-conductive composition. Such a composition may be as described in relation to Example 1 or, alternatively, it may be a conductive graphite ink such as marketed by Coates Special Products as XZ200.

Preferably the interconnected grid pattern comprises an intersecting pattern of lines of dimension and spacing such as to leave visible light coloured areas having a maximum straight line dimension of 24mm side by side with dark areas having similar dimensions.

In the case of both examples 1 and 2 an optional step involves melt extrusion coating a layer of a polyolefin such as polyethylene or polypropylene onto each side of the woven fabric before it is coated with the discontinuous conductivity and

visibility layers as before described. The melt extruded layer can provide improved air impermeability and better resistance to tearing localised around fastening points.

In the examples graphite was cited as a preferred component. In similar examples within the scope of the invention other dark coloured conductive agents could be used, such as particles or fibres of stainless steel, copper, carbonised synthetic yarns or fibres and metallic coated fibres.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A fabric comprising a flexible plastics substrate having both sides coated with a first layer of white or light reflective flame retardant composition over which is a further layer of a continuous grid pattern dark coloured semi-conductive liquiform composition, both compositions being applied as liquids to the substrate and subsequently dried or solidified.

2. A fabric as claimed in claim 1 in which the flexible plastics substrate is a woven polyolefin.

3. A fabric as claimed in claim 2 in which the woven fabric is made from tapes selected from the group comprising polyethylene and polypropylene.

4. A fabric as claimed in any one of the preceding claims which additionally includes a melt extrusion coating of polyolefin such as polyethylene or polypropylene underlying the white or light reflective composition.

5. A fabric as claimed in any one of the preceding claims wherein the grid pattern comprises a pattern having dimension and spacing such as to leave exposed white or light reflective areas between the lines having a maximum straight line dimension of 24mm.

6. A fabric as claimed in any one of the preceding claims in which the dark coloured semi-conductive liquid composition contains a proportion of graphite effective in imparting semi-conductivity in the dried or solidified composition.

7. A fabric as claimed in claim 6 in which the proportion of graphite is in the range 10-20% by mass.

8. A fabric comprising a flexible plastics substrate coated both sides with a layer of dark coloured semi-conductive flame retardant composition over which is a discontinuous white or light reflective visibility layer applied as a liquid composition, both compositions being dried or solidified after application.

9. A fabric as claimed in claim 8 in which the white or light reflective visibility layer comprises a pattern of squares applied over the previously dried or solidified dark coloured composition to provide white or light reflective discrete areas having a maximum straight line dimension of 24mm.

10. A method of rendering a flexible sheet plastics substrate both semi-conductive and light reflecting including the steps of:

(a) melt extruding onto at least one surface of the substrate a layer of a polyolefin such as polyethylene or polypropylene and allowing the layer to solidify;
(b) applying a white or light reflective flame retardant composition in the form of a liquid to both exposed surfaces;
(c) causing the white or light reflective composition to dry or solidify;
(d) applying in a grid pattern a dark coloured semi-conductive composition in the form of a liquid to both surfaces of the white or light reflective composition;
(e) causing the semi-conductive composition to dry or solidify.

DATED this 28th day of October 1993

RHEEM AUSTRALIA LIMITED

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